Docket No: **YHK-0119** PATENT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND INTERFERENCE

In re Application of

Hyun Mok YU and Joong Seo PARK

Serial No: **10/662,406**

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Group Art Unit: **2629**

Examiner: **Sherman, Stephen G.**

Customer No: **34610**

For: **METHOD AND APPARATUS FOR DRIVING PLASMA DISPLAY PANEL**

APPEAL BRIEF

U.S. Patent and Trademark Office
Customer Window, Mail Stop Appeal Brief-Patents
Randolph Building
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Sir:

This Appeal Brief is submitted pursuant to the Notice of Appeal filed on April 23, 2007, in connection with the above-identified application.

REAL PARTY IN INTEREST

The real party in interest is LG Electronics Inc. by virtue of an Assignment recorded on September 16, 2003, at reel/frame 014518/0012.

RELATED APPEALS AND INTERFERENCES

No appeals or interferences are pending in connection with this application.

STATUS OF THE CLAIMS

Claims 5-8, 14-17, and 19-30 have been rejected at least twice and are the subjects of this appeal. A complete copy of the claims on appeal is set forth in the Appendix attached to this paper. Claims 1-4, 9-13, and 18 have been canceled.

STATUS OF AMENDMENTS

There is no status to report regarding the non-entry of any after-final amendments. All claim amendments have been entered and the claims on appeal have been at least twice rejected, thereby making the appeal proper.

SUMMARY OF THE CLAIMED SUBJECT MATTER

A plasma display panel generates images by inducing the emission of colored light from a plurality of display cells. The light forms an image and when images are generated in succession a moving picture or movie is displayed.

In order to control the emission of light from each display cell, a driving apparatus generates control signals for processing input video data into a form suitable for viewing on the

panel. The input data is driven in frames, with each frame divided into sub-fields that include sustaining pulses that collectively produce an intended gray level corresponding to the data.

One non-limiting example of a driving apparatus is shown in Figure 6 of the application drawings. This apparatus includes first and second inverse gamma controllers 61A and 61B, a gain adjuster 62, an error diffuser 63, and an average picture level controller 67. As discussed, for example, at pages 13-17 of the specification, the inverse gamma controllers perform inverse gamma correction on input data to, for example, perform a brightness value conversion.

The gain adjuster amplifies red, green, and blue video data corrected by the first inverse gamma controller. This data is amplified by a gain based on the output of controller 67, which detects an average brightness per frame of data corrected by the second inverse gamma controller.

The error diffuser diffuses an error component into adjacent cells with respect to data output from the gain adjuster. This operation may effect a fine adjustment of the brightness value. Additional elements of the driving apparatus are recited in the claims, beginning with claim 5 which is discussed immediately below.

Independent Claim 5

Claim 5 recites a driving apparatus for a plasma display panel in which one frame period is time-divided into a plurality of sub-fields, each of which is given by a certain weighting value. The driving apparatus includes two features: a gray level detector and an adjuster.

The gray level detector detects a gray level distribution of the input video data. The gray

level distribution may be detected in a variety of ways including but not limited to histogram form or by predetermined gray level regions. An example of this detector is shown by reference numeral 7 in Figure 6 and is discussed, for example, at page 14, lines 11-25 of the specification.

The adjuster adjusts at least one of the number of sustaining pulses or a sub-field arrangement in accordance with the **detected gray level distribution** of the data. (See page 13, lines 17-28, with reference to Figure 6.)

An example of how the number of sustaining pulses may be adjusted is disclosed at pages 14 and 15. According to this example, if the gray level distribution has more low gray levels than other levels, adjuster 4 may reduce the number of sustaining pulses to lower picture brightness. If the gray level distribution has more high gray levels than other levels, adjuster 4 may increase the number of sustaining pulses to increase picture brightness. (These adjustments are merely illustrative of the invention and are not intended to have a limiting effect on the scope of claim 5. Moreover, these specific adjustments are recited in the dependent claims discussed *infra.*)

An example of how the sub-field arrangement of the input data may be adjusted is disclosed at pages 15-17. According to this example, the adjuster includes sub-field arrangement selector 5, which, for example, selects one of a plurality of predetermined sub-field arrangements based on the gray level distribution detected by detector 7. In each of these arrangements, the same number of sub-fields are provided, but those sub-fields are arranged in different non-numerical orders according, for example, to the load corresponding to each sub-field. (See, for example, Figures 5A-5C, Figure 8, and Table 1.) The selected sub-field arrangement is used as a

basis for controlling display of the input video data.

By using the expression "at least one of the number of sustaining pulses or a sub-field arrangement," it is clear that the adjuster of claim 1 may include sustaining pulse number adjuster 4, sub-field arrangement selector 5, or both. By controlling the number of sustaining pulses or sub-field arrangement, or both, in this manner, the driving apparatus may reduce contour noise in a manner that produces improved picture quality, although this advantage is not a necessity and should not be held to be limiting of the claims.

Dependent Claims 6-8 and 19-30

Claim 6 recites that the adjuster adjusts both the number of sustaining pulses and a sub-field arrangement in accordance with the gray level distribution of said data. (See, for example, page 13, lines 17-28, with reference to Figure 6.)

Claim 7 recites that the adjuster reduces the number of sustaining pulses when gray levels of said data concentrate on a low gray level. This reduction may, for example, reduce picture brightness. (See, for example, pages 14 and 15 of the specification with reference to Figure 6).

Claim 8 recites that the adjuster increases the number of sustaining pulses when gray levels of said data concentrate on a high gray level. This rejection may, for example, increase picture brightness. (See, for example, pages 14 and 15 of the specification with reference to Figure 6).

Claim 19 recites an average picture level controller which detects an average brightness of the data and outputs information to set a number of sustaining pulses in each of a predetermined

number of sub-fields corresponding to the data. This features corresponds, for example, to the APL controller 67 in Figure 6, as disclosed at pages 13 and 14 of the specification.

Claim 20 recites that the average picture level detector detects the average brightness of the data as received from an inverse gamma controller. (See, for example, Figure 6).

Claim 21 recites that the <u>number of the sub-fields after the adjustment equals the number of sub-fields before the adjustment</u> for driving the panel. Thus, for example, 8 sub-fields may be used to display input data. Based on the detected gray-level distribution, the number of sustaining pulses and/or the sub-field arrangement may be adjusted. However, the same number of sub-fields (e.g., 8) is maintained. (See pages 13-17 with reference to Figures 6-8, and particularly Figures 5A-5C).

Claim 22 the weighting value assigned to each of the predetermined number of sub-fields is same before and after the adjustment. (See, for example, page 10, lines 17-20, of the specification.)

Claim 23 recites that the adjuster generates a histogram of gray-level values corresponding to the gray-level distribution of the data, the adjuster performing the adjustment based on the histogram. (See, for example, page 14, lines 11-25, of the specification.)

Claim 24 recites that the detector divides the gray-level distribution into a plurality of predetermined regions, and that the adjuster compares the gray-level distribution in the regions and adjusts the number of sustaining pulses in one or more of the predetermined sub-fields based on the comparison. (See, for example, pages 14 and 15 of the specification.)

Claim 25 recites that the adjuster performs said comparison to determine a region having largest gray-level distribution and adjusts the number of sustaining pulses in one or more of the sub-fields to produce a corresponding change in brightness of the displayed image. (See, for example, pages 14 and 15 of the specification.)

Claim 26 recites that the adjuster decreases the number of sustaining pulses to less than a predetermined references value when the largest gray-level distribution is located in a region corresponding to a low range of gray levels. (See, for example, pages 14 and 15 of the specification.)

Claim 27 recites that the adjuster increases the number of sustaining pulses to more than the predetermined reference value when the largest gray-level distribution is located in a region corresponding to a high range of gray levels. (See, for example, pages 14 and 15 of the specification.)

Claim 28 recites that adjuster includes a sub-field arrangement selector which selects one of a plurality of pre-stored sub-field arrangements based on the gray-level distribution of said data. (See, for example, pages 15 and 16 of the specification with reference to Figure 8).

Claim 29 recites that the sub-field arrangements are predetermined to reduce contour noise for different regions having a largest portion of the gray-level distribution. (See, for example, pages 15 and 16 of the specification with reference to Figure 8).

Claim 30 recites different arrangements of sustaining pulses. In a first arrangement, the number of sustaining pulses in the sub-fields changes in ascending order. In a second

arrangement, the number of sustaining pulses in a first portion of the sub-fields changes in ascending order. Claim 30 further recites that the number of sustaining pulses in a second portion of the sub-fields includes a maximum number of sustaining pulses, and the number of sustaining pulses in a third portion of the sub-fields changes in descending order.

In a third arrangement, the number of sustaining pulses in a first portion of the sub-fields changes in ascending order and the number of sustaining pulses in a second portion of the sub-fields are set to a same number of sustaining pulses. (See, for example, pages 15-17 and Figures 5A - 5C.)

Independent Claim 14

Claim 14 recites a method of driving a plasma display panel, in which one frame period is time-divided into a plurality of sub-fields each given by a certain weighting value. The method includes steps which correspond to the functions of the detector and adjuster in claim 5, without being limited by any of the structural features recited in that claim. Specifically, claim 14 recites the steps of detecting a gray level distribution of a data, and adjusting at least one of the number of sustaining pulses or a sub-field arrangement in accordance with a gray level distribution of said data. (For an exemplary disclosure of these features, see pages 13-17 of the specification with reference to Figures 6-8.)

Dependent Claims 15-17

Claim 15 recites the step of adjusting both the number of sustaining pulses and a sub-

field arrangement in accordance with the gray level distribution of said data. (See, for example, page 13, lines 17-28, with reference to Figure 6.)

Claim 16 recites reducing the number of sustaining pulses when gray levels of said data concentrate on a low gray level. (See, for example, pages 14 and 15 of the specification with reference to Figure 6).

Claim 17 recites increasing the number of sustaining pulses when gray levels of said data concentrate on a high gray level. (See, for example, pages 14 and 15 of the specification with reference to Figure 6).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1) Claims 5, 6, 14, 15, 21, 22, 28, and 29 stand rejected under 35 USC § 102(b) for being anticipated by the Tajima patent.

2) Claims 7, 8, 16, and 17 stand rejected under 35 USC § 103(a) for being obvious in view of a Tajima-Tanabe combination.

3) Claims 19 and 20 stand rejected under 35 USC § 103(a) for being obvious in view of a Tajima-AAPA combination.

4) Claims 23-27 and 30 stand rejected under 35 USC § 103(a) for being obvious in view of Tajima taken alone.

5) Claims 5 and 14 stand rejected under 35 USC § 112, second paragraph, for failing to provide antecedent basis for a claim term.

6) Claim 19 was found to be objectionable for failing to include a period at the end of the claim.

ARGUMENT

Appellant respectfully submits that the rejections in the Office Action issued on January 23, 2007, are improper for the following reasons.

I. Claims 5, 6, 14, 15, 21, 22, 28, and 29 are Not Anticipated by the Tajima Patent

Claim 5 recites two features of interest:

1) "a gray level detector for the detecting a gray level distribution of a data," and

2) "an adjuster for adjusting at least one of the number of sustaining pulses or a subfield arrangement in accordance with a gray level distribution of said data."

In order to establish a *prima facie* case of anticipation for claim 5, the Tajima patent must disclose all the features of claim 5 <u>exactly</u>. There can be no differences or omissions whatsoever.

See MPEP § 2131 *et seq.*, *In re Schrieber*, 44 USPQ.2d 1429 (Fed. Cir. 1998), and more recently *In re Johnston*, 77 USPQ.2d 1788 (Fed. Cir. 2006). The Tajima patent does not satisfy this test.

The Tajima patent discloses a driver for a plasma display panel. The driver includes a gray-scale level adjustment means 75 which re-arranges the sequence of sub-frames in a frame of input data. (See Figure 1). This results in an adjustment of the gray-scale level of the image on the display.

Adjustment means 75 performs its rearranging function based on two input signals: (1) a frame selection (FQ) signal and (2) an RCA1 signal.

The frame selection (FQ) signal is generated based on a vertical synchronization signal (V_{SYNC}). That is, based on V_{SYNC}, frame counter 79 generates frame selection signal (FQ) for input into storage means 78. Storage means 78, then, selects the region that indicates the sequence of sustained discharge of the sub-frames for display. See column 16, lines 34-40, which provides in relevant part:

> [T]he gray-scale level adjustment means 75 is formed from a frame counter 79 and a sub-frame sequence pattern storage means 78, and this has the function of setting the turn-on sequence of sub-frames, for the purpose of appropriately rearranging the sustained discharge sequence of the number of sub-frames. (See column 16, lines 14-19)
>
> The frame counter 79 in controlled by the <u>vertical synchronization signal (V_{SYNC})</u> and, in response to this vertical synchronization signal (V_{SYNC}), outputs a <u>frame selection signal (FQ)</u>. This frame selection signal (FQ) is connected to the sub-frame sustained discharge sequence pattern storage means 78, and selects the region that indicates the sequence of sustained discharge of the sub-frames within the frame. (See column 16, lines 34-40)(Emphasis added)

The RCA1 signal determines the sub-frame data to be read from the input data. More specifically, as disclosed at column 6, lines 50 and 51, the RCA1 signal corresponds to an upper order read column address of the sub-frame data to be displayed. (See column 6, lines 40-42).

Based on the FQ and RCA1 signals, the gray-level adjustment means 75 selects which of a plurality of pre-stored sub-frame sequence patterns is to be used to display input data. In the Office Action, the Examiner relied on the gray-scale level adjustment means to supply all the features of claim 5. However, adjustment means 75 does not include either element recited in this claim.

A. Adjustment Means 75 Does Not Perform the "Adjuster" Function

Adjustment means 75 re-arranges the sequence of sub-frames in a frame of input data based on two input signals: frame selection (FQ) signal and RCA1 signal. This produces a corresponding adjustment in the gray-scale level of the displayed image. However, neither the FQ signal nor the RCA1 signal is indicative of a detected gray-scale level distribution of input data as recited in claim 5.

As previously indicated, the frame selection (FQ) signal is generated based on a vertical synchronization signal (V_{SYNC}) and is used by storage means 78 to select a region that indicates a sequence of sustained discharge of the sub-frames for display. The RCA1 signal corresponds to an upper order read column address of sub-frame data to be read and displayed. (See column 6, lines 40-51). Neither of these signals corresponds to a detected gray-scale level

distribution of input data as recited in claim 5. Accordingly, adjustment means 75 does not perform the function of an adjuster which adjusts "at least one of the number of sustaining pulses or a subfield arrangement **in accordance with a gray level distribution of said data**" as in claim 5.

B. Adjustment Means 75 Does Not Perform the "Detector" Function

Adjustment means 75 also does not perform the function of the detector recited in claim 5, namely "detecting a gray level distribution of" the input data. Rather, Tajima discloses the function of the adjustment means to be re-arranging the sequence of sub-frames in a frame of input data, to effect a corresponding adjustment of the gray-scale level of the image shown on the display. (See column 16, lines 34-51 with reference to Figure 1.)

Moreover, in the Office Action, the Examiner did not point out where a gray-level detector is shown in any of the drawings of the Tajima patent. Instead, the Examiner indicated that such a detector was implicitly included in Tajima. More specifically, the Examiner indicated that the function of selecting a sequence of sub-frames based on FQ and RCA1 signals <u>necessarily requires</u> adjustment means 75 to also perform the function of ***detecting*** a gray-level distribution. Applicants respectfully submitted that this is an improper reading of Tajima.

Moreover, the Examiner's use of the phrase 'necessarily requires' is tantamount to an assertion of inherent anticipation of the detecting function by Tajima. However, detecting a gray-level distribution is neither disclosed nor necessarily required by Tajima in order for means 75 to perform based on the FQ and RCA1 signals.

Specifically, the selection of a sequence in storage means 78 is performed based on FQ and RCA1 signals. In the Final Office Action, the Examiner acknowledged that the vertical synchronization signal V_{SYNC} (and thus the FQ signal) was not indicative of a gray-level distribution of data output from a detector. The same is true of the RCA1 signal.

That is, the Tajima patent expressly discloses that the RCA1 signal is merely indicative of a column address of frame data to be read. The Tajima patent does not disclose that the RCA1 signal is indicative of a gray-level distribution detected by a gray level detector, such as shown, for example, by reference numeral 7 in the non-limiting embodiment of Figure 6 of Applicants' drawings.

Contrary to the Examiner's assertion, the selection of a sub-frame sequence in storage means 78 therefore takes place without receiving gray-scale level distribution data from a gray-scale level detector. Moreover, the Tajima patent makes no disclosure, express or implied, of a gray level detector, or of adjusting a subfield arrangement based on a gray-scale level distribution detected by a detector. Therefore, detection of a gray level distribution is not a necessary pre-requisite in the Tajima circuit and therefore the features recited in claim 5 are not inherently anticipated.

In view of the foregoing considerations, Appellants submit that the Tajima patent fails to disclose all the features of claim 5 including the gray-level detector and the adjuster. Because the Tajima patent does not disclose all the features of claim 5, Appellants submit that Tajima cannot

be relied on to establish a *prima facie* case of anticipation for claim 5 or any of its dependent claims.

Claim 6 recites that the "adjuster adjusts both the number of sustaining pulses and a sub-field arrangement in accordance with the gray level distribution of said data." (Emphasis added). The Tajima patent does not disclose these features, i.e., Tajima discloses re-arranging the sub-fields of input data based on a frame selection signal (FQ) and a column address signal RCA1. Neither signal is indicative of a gray-scale level distribution of data generated from a detector as recited in claim 5. Consequently, Tajima also fails to disclose the features of claim 6.

Claim 14 recites features similar to those which patentable distinguish claim 5 from the Tajima patent, e.g., "detecting a gray level distribution of a data" and "adjusting at least one of the number of sustaining pulses or a sub-field arrangement in accordance with a gray level distribution of said data." The Tajima patent does not disclose these features. Appellants therefore submit that the Tajima patent cannot be relied on to establish a *prima facie* case of anticipation for claim 14 or any of its dependent claims.

Claim 21 recites that "the number of the sub-fields after said adjustment equals the number of sub-fields before said adjustment for driving the panel." These features are not taught or suggested by Tajima, i.e., that the number of sub-fields used to display input data is the same both before and after either the number of sustaining pulses is adjusted and/or the sub-field arrangement is adjusted.

Claim 29 recites that "the sub-field arrangements are predetermined to reduce contour noise for different regions having a largest portion of the gray-level distribution." The Tajima patent does not disclose these features. In rejecting claim 29, the Examiner relied on the disclosure at column 42, lines 53-60, of Tajima. But this portion of Tajima only discloses selecting a sequence of sub-frames having an alternating arrangement of high and low weights. Neither this portion of Tajima nor any other portion discloses sub-field arrangements which are predetermined to reduce contour noise for different regions having a largest portion of the detected gray-level distribution.

II. Claims 7, 8, 16, and 17 are Non-Obvious Over a Tajima-Tanabe Combination

Claim 7 recites that the adjuster "reduces the number of sustaining pulses when gray levels of said data concentrate on a low gray level." (Emphasis added). The Tanabe publication does not disclose these features.

The Tanabe publication discloses a controller for driving a display panel. The controller includes a gray scale number judging circuit 22 and a driving control circuit 30. The judging circuit 22 counts the number of gray scale levels that exist in the data of one display screen. The driving control circuit then reduces or increases the number of sub-fields used to display that data based on the number of gray scale levels.

Unlike claim 7, regardless of the number of sub-fields that are used, Tanabe maintains the same number of sustaining pulses to display input data. This is clear from a comparison of

Figures 8A - 8H, where a total number of sustaining pulses across all sub-fields remains the same regardless of whether eight sub-fields are used (Figure 8A) or whether one sub-field is used (Figure 8H). Appellants therefore submit that the features of claim 7 are not taught or suggested by the Tanabe publication or the Tajima patent, whether taken alone or in combination.

Claim 8 recites that the adjuster <u>increases the number of sustaining pulses</u> when gray levels of the data concentrate on a high gray level. The Tanabe publication does not teach or suggest these features, i.e., Tanabe discloses reducing or increasing the number of sub-fields but not the number of sustaining pulses. Accordingly, Appellants submit that claim 8 is non-obvious over a Tajima-Tanabe combination.

Claim 16 recites reducing the <u>number of sustaining pulses</u> when gray levels of said data concentrate on a low gray level, and claim 17 recites increasing the <u>number of sustaining pulses</u> when gray levels of said data concentrate on a high gray level. The Tanabe publication does not teach or suggest these features. Accordingly, it is submitted that claims 16 and 17 are non-obvious over a Tajima-Tanabe combination.

III. <u>Claims 19 and 20 are Non-Obvious over Tajima-AAPA Combination</u>

Appellants submit that claims 19 and 20 are not obvious in view of a Tajima-AAPA combination, because AAPA does not teach or suggest the features of base claim 5 missing from the Tajima patent.

IV. Claims 23-27 and 30 are Non-Obvious over Tajima

Claim 23 recites that the adjuster of claim 5 generates a histogram of gray-level values corresponding to the gray-level distribution of said data, the adjuster performing said adjustment based on the histogram. In view of the foregoing discussion in Section I of this paper, the Tajima patent does not teach or suggest the adjuster of base claim 5. It therefore logically follows that Tajima does not teach or suggest the features of claim 23, which further defines functions performed by this adjuster.

Claim 24 recites that the detector divides the gray-level distribution into a plurality of predetermined regions, and that the adjuster compares the gray-level distribution in the regions and adjusts the number of sustaining pulses in one or more of the predetermined sub-fields based on the comparison. The Tajima patent does not teach or suggest the detector and adjuster of base claim 5. It therefore logically follows that Tajima does not teach or suggest the features of claim 24, which further defines functions the detector and adjuster.

That is, Tajima does not teach or suggest a detector which divides a detected gray-level distribution into a plurality of predetermined regions, and an adjuster <u>compares the gray-level distribution in the regions</u> and <u>adjusts the number of sustaining pulses in one or more of the predetermined sub-fields based on the comparison</u>. Absent a teaching or suggestion of these features, the Tajima patent cannot be relied on to establish a *prima facie* case of obviousness of claim 24.

Claim 25 recites that the adjuster performs said comparison to <u>determine a region having</u>

largest gray-level distribution and adjusts the number of sustaining pulses in one or more of the sub-fields to produce a corresponding change in brightness of the displayed image. The Tajima patent does not teach or suggest the adjuster of base claim 5. It therefore logically follows that Tajima does not teach or suggest the additional functions of the adjuster recited in claim 25.

Claim 26 recites that the adjuster decreases the number of sustaining pulses to less than a predetermined references value when the largest gray-level distribution is located in a region corresponding to a low range of gray levels. Tajima discloses re-arranging sequences of sub-frames of input data. However, Tajima does not teach or suggest the functions of the adjuster defined in claim 5, nor does not teach or suggest the additional functions of the adjuster as recited in claim 26, including decreasing the number of sustaining pulses to less than a predetermined references value when the largest gray-level distribution is located in a region corresponding to a low range of gray levels.

Claim 27 recites that the adjuster increases the number of sustaining pulses to more than the predetermined reference value when the largest gray-level distribution is located in a region corresponding to a high range of gray levels. The Tajima patent does not teach or suggest these features.

Claim 30 recites different sub-field arrangements for accomplishing the reduction in contour noise for different regions having a largest portion of the gray-level distribution as recited in claim 29. Specifically, these arrangements include:

a) "in a first arrangement, the number of sustaining pulses in the sub-fields changes

in ascending order"

b) "in a second arrangement, the number of sustaining pulses in a first portion of the sub-fields changes in ascending order, the number of sustaining pulses in a second portion of the sub-fields includes a maximum number of sustaining pulses, and the number of sustaining pulses in a third portion of the sub-fields changes in descending order" and

c) "in a third arrangement, the number of sustaining pulses in a first portion of the sub-fields changes in ascending order and the number of sustaining pulses in a second portion of the sub-fields are set to a same number of sustaining pulses." (See, for example, Figures 5A-5C of Applicants' drawings for these sub-field arrangements).

The Tajima patent does not teach or suggest these features. Accordingly, Tajima cannot be relied on to establish a *prima facie* case of obviousness of claim 30.

V. Claims 5 and 14 are Not Indefinite Under 35 USC § 112, Second Paragraph

Claim 5 recites "the number of sustaining pulses." Appellants submit that the meaning of this phrase is clear in view of the specification. For example, the specification discloses that a frame of data is divided into sub-fields, with each subfield containing a sustain period that contain sustaining pulses. Accordingly, one skilled in the art would understand that the sub-fields and sub-field arrangement recited in claim 5 includes sustaining pulses. Based on this understanding, it is submitted that claim 1 complies with the requirements of § 112, second paragraph.

The same reasoning may be applied for claim 14 in terms of its compliance with § 112, second paragraph.

VI. The Objection of Claim 19

Appellants submit that the inclusion of the period at the end of claim 19 is evident.

For the foregoing reasons, Appellants respectfully request the Board to reverse the rejections in the outstanding Office Action.

Respectfully submitted,
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CLAIMS APPENDIX

5. A driving apparatus for a plasma display panel in which one frame period is time-divided into a plurality of sub-fields each given by a certain weighting value, said driving apparatus comprising:

a gray level detector for detecting a gray level distribution of a data; and

an adjuster for adjusting at least one of the number of sustaining pulses or a sub-field arrangement in accordance with a gray level distribution of said data.

6. The driving apparatus as claimed in claim 5, wherein said adjuster adjusts both the number of sustaining pulses and a sub-field arrangement in accordance with the gray level distribution of said data.

7. The driving apparatus as claimed in claim 5, wherein said adjuster reduces the number of sustaining pulses when gray levels of said data concentrate on a low gray level.

8. The driving apparatus as claimed in claim 5, wherein said adjuster increases the number of sustaining pulses when gray levels of said data concentrate on a high gray level.

14. A method of driving a plasma display panel in which one frame period is time-divided into a plurality of sub-fields each given by a certain weighting value, said method comprising the steps of:

detecting a gray level distribution of a data; and

adjusting at least one of the number of sustaining pulses or a sub-field arrangement in accordance with a gray level distribution of said data.

15. The method as claimed in claim 14, wherein said step of adjusting said at least one of the number of sustaining pulses and said sub-field arrangement adjusts both the number of sustaining pulses and a sub-field arrangement in accordance with the gray level distribution of said data.

16. The driving apparatus as claimed in claim 14, wherein said step of adjusting said at least one of the number of sustaining pulses and said sub-field arrangement reduces the number of sustaining pulses when gray levels of said data concentrate on a low gray level.

17. The driving apparatus as claimed in claim 14, wherein said step of adjusting said at least one of the number of sustaining pulses and said sub-field arrangement increases the number of sustaining pulses when gray levels of said data concentrate on a high gray level.

19. The driving apparatus of claim 5, further comprising:

an average picture level controller which detects an average brightness of said data and outputs information to set a number of sustaining pulses in each of a predetermined number of sub-fields corresponding to said data,

20. The driving apparatus of claim 19, wherein the average picture level detector detects the average brightness of said data as received from an inverse gamma controller.

21. The driving apparatus of claim 5, wherein the number of the sub-fields after said adjustment equals the number of sub-fields before said adjustment for driving the panel.

22. The driving apparatus of claim 5, wherein the weighting value assigned to each of the predetermined number of sub-fields is same before and after said adjustment.

23. The driving apparatus of claim 5, wherein the adjuster generates a histogram of gray-level values corresponding to the gray-level distribution of said data, the adjuster performing said adjustment based on the histogram.

24. The driving apparatus of claim 5, wherein the detector divides the gray-level distribution into a plurality of predetermined regions, and wherein the adjuster compares the

gray-level distribution in the regions and adjusts the number of sustaining pulses in one or more of the predetermined sub-fields based on the comparison.

25. The driving apparatus of claim 24, wherein the adjuster performs said comparison to determine a region having largest gray-level distribution and adjusts the number of sustaining pulses in one or more of the sub-fields to produce a corresponding change in brightness of the displayed image.

26. The driving apparatus of claim 25, wherein the adjuster decreases the number of sustaining pulses to less than a predetermined references value when the largest gray-level distribution is located in a region corresponding to a low range of gray levels.

27. The driving apparatus of claim 25, wherein the adjuster increases the number of sustaining pulses to more than the predetermined reference value when the largest gray-level distribution is located in a region corresponding to a high range of gray levels.

28. The driving apparatus of claim 5, wherein the adjuster includes:

a sub-field arrangement selector which selects one of a plurality of pre-stored sub-field arrangements based on the gray-level distribution of said data.

29. The driving apparatus of claim 28, wherein the sub-field arrangements are predetermined to reduce contour noise for different regions having a largest portion of the gray-level distribution.

30. The driving apparatus of claim 29, wherein:

in a first arrangement, the number of sustaining pulses in the sub-fields changes in ascending order,

in a second arrangement, the number of sustaining pulses in a first portion of the sub-fields changes in ascending order, the number of sustaining pulses in a second portion of the sub-fields includes a maximum number of sustaining pulses, and the number of sustaining pulses in a third portion of the sub-fields changes in descending order; and

in a third arrangement, the number of sustaining pulses in a first portion of the sub-fields changes in ascending order and the number of sustaining pulses in a second portion of the sub-fields are set to a same number of sustaining pulses.

EVIDENCE APPENDIX

Appellant has not provided or relied on any evidence in connection with this appeal and therefore there is no evidence to submit or discuss in this appendix.

RELATED PROCEEDINGS APPENDIX

No decisions by a court of the Board have been rendered in connection with this or any related application, or in connection with any proceeding identified in the related appeals and interferences section. Therefore, there are no copies to submit in connection with this appendix.